

CLAIMS

1. A spinal anchor assembly for securing a fixation element, comprising:
  - an anchor element configured for attachment to a bone, and having a proximal portion including an open slot for passing the fixation element therethrough and the proximal portion having radially inwardly protruding flange segments; and
    - a twist-in cap for closing the open slot of the anchor element; wherein the proximal portion and the cap are adapted to twist-lock together by a partial rotation of the cap from an open position to a closed position to cover the slot so as to capture the fixation element and to lock the cap in the closed position.
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2. The assembly of claim 1, wherein the cap and anchor element each include detent elements that engage to lock the cap in the closed position.
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3. The assembly of claim 2, wherein a first one of the cap and anchor detent elements is a protrusion and a second one of the cap and anchor detent elements is a recess configured to capture the protuberance.
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4. The assembly of claim 3, wherein the anchor detent element is provided on the anchor flange segment.
5. The assembly of claim 3, wherein the first one of the cap and anchor detent elements is a longitudinal protrusion and the second one of the cap and anchor detent elements is a longitudinal slot.
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6. The assembly of claim 3, wherein the cap includes radially outwardly protruding flange segments, the cap flange segments being captured by the anchor element flange segments when the cap is in the closed position.
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7. The assembly of claim 6, wherein the cap and anchor flange segments are provided with a radial slant in a direction that extends toward a distal end of the anchor element when moving inward toward the cap.

8. The assembly of claim 7, wherein the radial slant is in a direction such that the flange segments can slide with respect to each other when a load is applied to secure the fixation element within the slot.

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9. The assembly of claim 7, wherein the radial slant is in a direction such that securing the fixation element within the slot causes a displacement of the anchor flange segments inwardly.

10. The assembly of claim 7, wherein the radial slant is in a direction such that securing the fixation element within the slot causes the detent elements to engage with greater strength.

11. The assembly of claim 1, wherein the cap further includes a centrally placed clamping member for tightening down to further clamp the fixation element within the slot.

15 12. The assembly of claim 12, wherein the clamping member is a set screw.

13. The assembly of claim 1, wherein the anchor element is a monoaxial screw.

14. The assembly of claim 1, wherein the anchor element is a polyaxial screw.

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15. An anchor assembly for securing a fixation element, comprising:  
an anchor element adapted for attachment to bone and defining a central longitudinal axis, the anchor element having an open slot for receiving the fixation element, side walls on opposed sides of the open slot, a proximal portion, a distal portion, and an anchor flange segment extending from each of the side walls in a direction toward the central longitudinal axis, the anchor flange segments each including an inferior contact surface ; and

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30 a closure element for closing the open slot in the anchor element and applying pressure to the fixation element to capture the fixation element within the open slot, the closure element including a closure body and a plurality of closure flange segments extending from the closure body in a direction that is transverse to the anchor element central longitudinal axis when the closure element is placed in the open slot, each closure flange segment including a superior

contact surface extending in a direction away from the central longitudinal axis when the closure element is placed in the open slot so that the closure flange segment superior surfaces engage the anchor element flange segment inferior surfaces over a contact area when the closure element is placed in a closed position in the anchor element open slot;

5       wherein the closure flange segments further include exterior surfaces that extend away from the longitudinal axis and proximally when the closure element is placed in the open slot to provide a partial cone shaped outer surface to the closure flanges.

10      16.     The assembly of claim 15, wherein the side walls become thinner in a proximal direction to correspond to the partial cone shaped outer surfaces of the closure flanges.

15      17.     The assembly of claim 15, wherein the anchor flange segment inferior surfaces extend in a direction toward the central longitudinal axis and toward the distal portion to define a radial slant and the closure flange segment superior surfaces extend in a direction away from the central longitudinal axis and toward the proximal portion of the anchor element at the radial slant when the closure element is placed in the open slot.

20      18.     The assembly of claim 17, wherein the radial slant is configured to permit the sliding of the anchor flange segment inferior surfaces with respect to the closure flange segment superior surfaces upon pressure being applied on the fixation element.

25      19.     The assembly of claim 17, wherein the radial slant is configured so that, when the closure element is in its closed position and pressure is applied to secure the fixation element within the open slot in the anchor element, the sidewalls are drawn together.

20      20.     The assembly of claim 17, wherein the radial slant is at an angle of approximately 45 degrees to the central longitudinal axis.

30      21.     The assembly of claim 15, wherein the closure element and anchor element each include detent elements that engage to lock the closure element in the closed position.

22. The assembly of claim 21, wherein a first one of the closure and anchor detent elements is a protrusion and a second one of the closure and anchor detent elements is a recess configured to capture the protuberance.
- 5 23. The assembly of claim 22, wherein the anchor detent element is provided on the anchor flange segment.
24. The assembly of claim 23, wherein the first one of the closure and anchor detent elements is a longitudinal protrusion and the second one of the closure and anchor detent elements is a longitudinal slot.
- 10 25. The assembly of claim 23, wherein the flanges are configured such that applying pressure to the fixation element within the slot causes the detent elements to engage with greater strength.
- 15 26. The assembly of claim 15, wherein the closure element further includes a centrally placed clamping member for applying pressure to the fixation element within the slot.
27. The assembly of claim 26, wherein the clamping member is a set screw.
- 20 28. An anchor assembly for securing a fixation element, comprising:  
an anchor element adapted for attachment to bone and defining a central longitudinal axis, the anchor element having an open slot for receiving the fixation element, side walls on opposed sides of the open slot, a proximal portion, a distal portion, and an anchor flange segment extending from each of the side walls in a direction toward the central longitudinal axis, the  
25 anchor flange segments each including an inferior contact surface extending in a direction toward the central longitudinal axis and toward the distal portion to define a radial slant; and  
a closure element for closing the open slot in the anchor element and applying pressure to the fixation element to capture the fixation element within the open slot, the closure element including a closure body and a plurality of closure flange segments extending from the closure body in a direction that is transverse to the anchor element central longitudinal axis when the  
30 closure element is placed in the open slot, each closure flange segment including a superior

contact surface extending in a direction away from the central longitudinal axis and toward the proximal portion of the anchor element at the radial slant when the closure element is placed in the open slot so that the closure flange segment superior surfaces engage the anchor element flange segment inferior surfaces over a contact area when the closure element is placed in a closed position in the anchor element open slot;

wherein the radial slant is configured to permit the sliding of the anchor flange segment inferior surfaces with respect to the closure flange segment superior surfaces upon pressure being applied on the fixation element.

10 29. The assembly of claim 28, wherein the closure flange segments further include exterior surfaces that extend away from the longitudinal axis and proximally when the closure element is placed in the open slot to provide a partial cone shaped outer surface to the closure flanges.

15 30. The assembly of claim 29, wherein the side walls become thinner in a proximal direction to correspond to the partial cone shaped outer surfaces of the closure flanges.

31. The assembly of claim 28, wherein the radial slant is configured so that, when the closure element is in its closed position and pressure is applied to secure the fixation element within the open slot in the anchor element, the sidewalls are drawn together.

20 32. The assembly of claim 28, wherein the radial slant is at an angle of approximately 45 degrees to the central longitudinal axis.

25 33. The assembly of claim 28, wherein the closure element and anchor element each include detent elements that engage to lock the closure element in the closed position.

34. The assembly of claim 33, wherein a first one of the closure and anchor detent elements is a protrusion and a second one of the closure and anchor detent elements is a recess configured to capture the protuberance.

35. The assembly of claim 34, wherein the anchor detent element is provided on the anchor flange segment.
36. The assembly of claim 35, wherein the first one of the closure and anchor detent elements is a longitudinal protrusion and the second one of the closure and anchor detent elements is a longitudinal slot.  
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37. The assembly of claim 33, wherein the radial slant is in a direction such that applying pressure to the fixation element within the slot causes the detent elements to engage with greater strength.  
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38. The assembly of claim 28, wherein the closure element further includes a centrally placed clamping member for applying pressure to the fixation element within the slot.
- 15 39. The assembly of claim 38, wherein the clamping member is a set screw.